38YDA
Two-Speed Split-System Heat Pump

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Installation and Start-Up Instructions

NOTE: Read the entire instruction manual before starting the installation.

This symbol → indicates a change since the last issue.

SAFETY CONSIDERATIONS

Improper installation, adjustment, alteration, service, maintenance, or use can cause explosion, fire, electrical shock, or other conditions which may cause death, personal injury, or property damage. Consult a qualified installer, service agency, or your distributor or branch for information or assistance. The qualified installer or agency must use factory-authorized kits or accessories when modifying this product. Refer to the individual instructions packaged with the kits or accessories when installing.

Follow all safety codes. Wear safety glasses, protective clothing, and work gloves. Use quenching cloth for brazing operations. Have fire extinguisher available. Read these instructions thoroughly and follow all warnings or cautions included in literature and attached to the unit. Consult local building codes and National Electrical Code (NEC) for special requirements.

Recognize safety information. This is the safety-alert symbol ⚠. When you see this symbol on the unit and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, and CAUTION. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **would** result in minor personal injury or product and property damage.

⚠ WARNING

Before installing, modifying, or servicing system, main electrical disconnect switch must be in the OFF position. There may be more than 1 disconnect switch. Lock out and tag switch with a suitable warning label. Electrical shock can cause personal injury or death.

INSTALLATION RECOMMENDATIONS

NOTE: In some cases noise in the living area has been traced to gas pulsations from improper installation of equipment.

1. Locate unit away from windows, patios, decks, etc. where unit operation sound may disturb customer.
2. Ensure that vapor and liquid tube diameters are appropriate to capacity of unit.
3. Run refrigerant tubes as directly as possible by avoiding unnecessary turns and bends.
4. Leave some slack between structure and unit to absorb vibration.
5. When passing refrigerant tubes through the wall, seal opening with RTV or other pliable silicon-based caulk. (See Fig. 2.)
6. Avoid direct tubing contact with water pipes, duct work, floor joists, wall studs, floors, and walls.

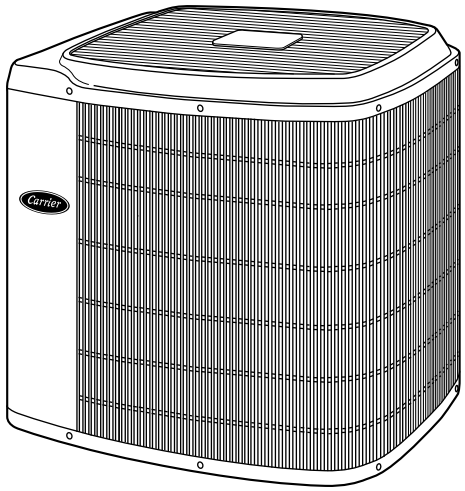

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Fig. 1—Model 38YDA

7. Do not suspend refrigerant tubing from joists and studs with a rigid wire or strap which comes in direct contact with tubing. (See Fig. 2.)
8. Ensure that tubing insulation is pliable and completely surrounds vapor tube.
9. When necessary, use hanger straps which are 1 in. wide and conform to shape of tubing insulation. (See Fig. 2.)
10. Isolate hanger straps from insulation by using metal sleeves bent to conform to shape of insulation.

When outdoor unit is connected to factory-approved indoor unit, outdoor unit contains system refrigerant charge for operation with indoor unit of the same size when connected by 15 ft of field-supplied or factory accessory tubing. For proper unit operation, check refrigerant charge using charging information located on control box cover or in the Check Charge section of this instruction.

IMPORTANT: Maximum liquid-line size is 3/8-in. OD for all residential applications.

IMPORTANT: Always install a liquid-line filter drier. Refer to Product Data Digest for appropriate part number. Obtain filter driers from your distributor or branch.

INSTALLATION

Step 1—Check Equipment and Job Site

UNPACK UNIT

Move to final location. Remove carton taking care not to damage unit.

INSPECT EQUIPMENT

File claim with shipping company prior to installation if shipment is damaged or incomplete. Locate unit rating plate on unit corner

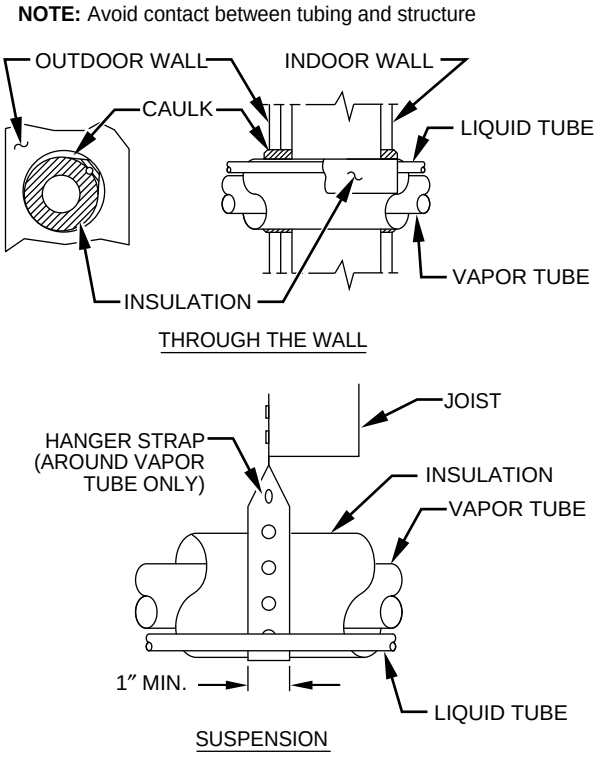

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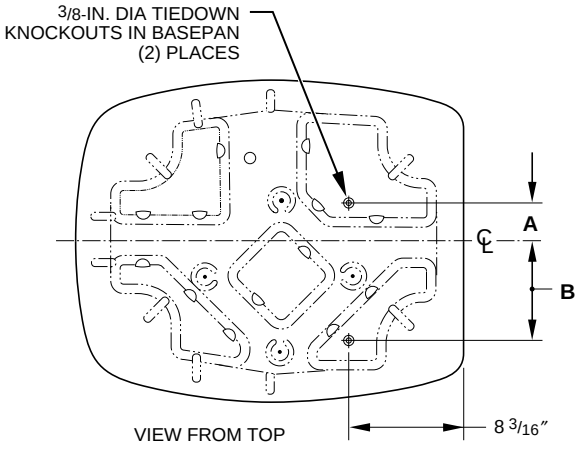
Fig. 2—Connecting Tubing Installation

panel. It contains information needed to properly install unit. Check rating plate to be sure unit matches job specifications.

Step 2—Install on a Solid, Level Mounting Pad

If conditions or local codes require the unit be attached to pad, tie down bolts should be used and fastened through knockouts provided in unit base pan. Refer to unit mounting pattern in Fig. 3 to determine base pan size and knockout hole location.



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Dimensions (In.)

UNIT SIZE	MINIMUM MOUNTING PAD DIMENSIONS	TIEDOWN KNOCKOUT LOCATIONS	
		A	B
036, 048, 060	26 X 32	5-1/16	9-11/16

Fig. 3—Mounting Unit to Pad

On rooftop applications, mount on level platform or frame. Place unit above a load-bearing wall and isolate unit and tubing set from structure. Arrange supporting members to adequately support unit and minimize transmission of vibration to building. Consult local codes governing rooftop applications.

NOTE: Unit must be level to within ± 2° (± 3/8 in./ft) per compressor manufacturer specifications.

Step 3—Clearance Requirements

When installing, allow sufficient space for airflow clearance, wiring, refrigerant piping, and service. Allow 30-in. clearance to service end of unit and 48 in. above unit. For proper airflow, a 6-in. clearance on 1 side of unit and 12 in. on all remaining sides must be maintained. Maintain a distance of 24 in. between units. Position so water, snow, or ice from roof or eaves cannot fall directly on unit.

On rooftop applications, locate unit at least 6 in. above roof surface.

Step 4—Operating Ambients

The minimum outdoor operating ambient in cooling mode is 55°F, and the maximum outdoor operating ambient in cooling mode is 125°F. The maximum outdoor operating ambient in heating mode is 66°F.

Step 5—Elevate Unit

⚠ CAUTION

Accumulation of water and ice in base pan may cause equipment damage.

Elevate unit per local climate and code requirements to provide clearance above estimated snowfall level and ensure adequate drainage of unit. Fig. 4 shows unit with accessory support feet installed. Use accessory snow stand in areas where prolonged freezing temperatures are encountered. Refer to separate Installation Instructions packaged with accessories.

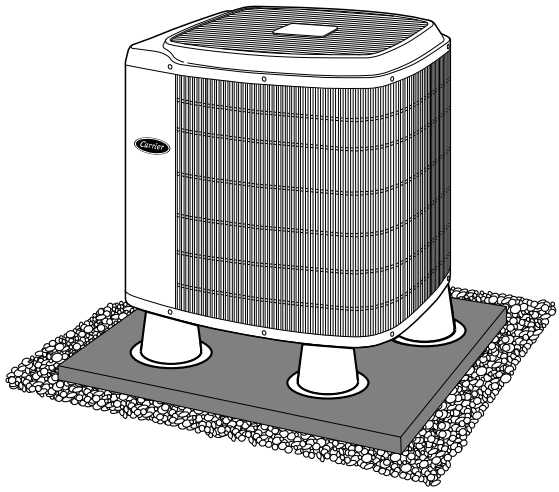

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Fig. 4—Accessory Support Feet

Step 6—Remove Indoor AccuRater® Piston and Replace with TXV

NOTE: If indoor unit is not equipped with a TXV, use an accessory indoor thermostatic expansion valve (TXV) when required. Refer to presale literature for proper Part No.

FURNACE COILS

Remove existing AccuRater from indoor coil and install required accessory TXV kit. (See Fig. 5.)

Install TXV kit to indoor coil as follows:

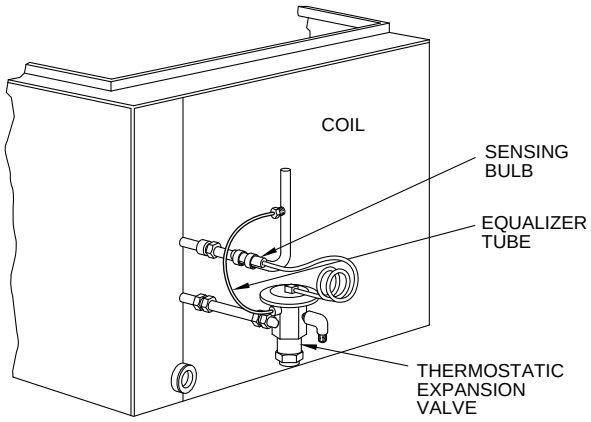

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Fig. 5—TXV Installed

1. Install suction tube adapter.
2. Install liquid flare-to-sweat adapter.
3. Install TXV on liquid flare-to-sweat adapter.
4. Connect external equalizer tube to fitting on suction tube adapter.
5. Position sensing bulb on horizontal portion of suction tube adapter. Secure using supplied hardware. Insulate bulb after installation. (See Fig. 6.)
6. Check all connections for leaks.

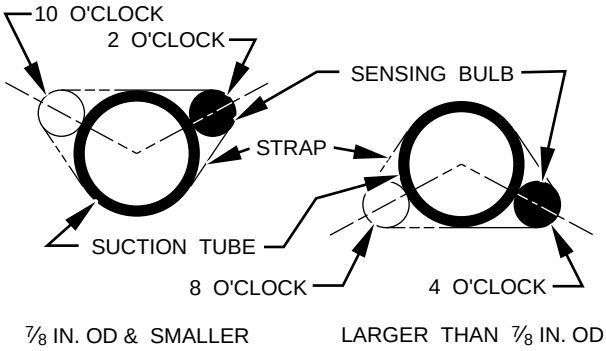

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Fig. 6—Positioning of Sensing Bulb

FAN COILS

If unit is installed with an 40FKA, FK4 or FC4 fan coil, no TXV change is necessary since these fan coils are factory-equipped with proper TXV.

If TXV installation is required, refer to TXV kit Installation Instructions for details on TXV installation.

Step 7—Make Piping Connections

⚠ WARNING

Relieve pressure and recover all refrigerant before system repair or final unit disposal to avoid personal injury or death. Use all service ports and open all flow-control devices, including solenoid valves.

⚠ CAUTION

To prevent compressor damage DO NOT bury more than 36 in. of refrigerant tubing. If ANY tubing is buried, provide 6-in. vertical rise at service valve.

Outdoor units may be connected to indoor section using accessory tubing package or field-supplied refrigerant grade tubing of correct size and condition. Tubing diameters listed in Table 1 are adequate for equivalent lengths up to 100 ft. DO NOT INSTALL EQUIVALENT INTERCONNECTING TUBING LENGTHS GREATER THAN 100 FT. Do not increase or decrease interconnecting tubing diameters.

Table 1—Refrigerant Connections and Recommended Liquid and Vapor Tube Diameters (In.)

UNIT SIZE	LIQUID		VAPOR	
	Connection Diameter	Tube Diameter	Connection Diameter	Tube Diameter
036, 048	3/8	3/8	7/8	7/8
060	3/8	3/8	7/8	1-1/8

NOTES:
1. Tube diameters are for lengths up to 100 equivalent ft.
2. Do not increase or decrease tubing sizes.

If refrigerant tubes or indoor coil are exposed to atmosphere, they must be evacuated to 500 microns to eliminate contamination and moisture in the system.

OUTDOOR UNIT CONNECTED TO FACTORY-APPROVED INDOOR UNIT

See Product Data Sheet for factory-approved indoor units.

Outdoor unit contains correct system refrigerant charge for operation with indoor unit of same size when connected by 15 ft of field-supplied or factory-accessory tubing. Check refrigerant charge for maximum efficiency.

REFRIGERANT TUBING

Connect tubing to fittings on outdoor unit vapor and liquid service valves. (See Table 1.) Use refrigerant grade tubing.

SWEAT CONNECTION

⚠ CAUTION

To prevent damage to unit or service valves observe the following:
• Use a brazing shield.
• Wrap service valves with wet cloth or use a heat sink material.

Service valves are closed from factory and ready for brazing. After wrapping service valve with a wet cloth, tubing set can be brazed to service valve using either silver bearing or non-silver bearing brazing material. Consult local code requirements. Refrigerant tubing and indoor coil are now ready for leak testing. This check should include all field and factory joints.

FINAL TUBING CHECK

IMPORTANT: Check to be certain factory tubing on both indoor and outdoor unit has not shifted during shipment. Ensure tubes are not rubbing against each other or any sheet metal. Pay close attention to feeder tubes, making sure wire ties on feeder tubes are secure and tight.

Step 8—Make Electrical Connections

⚠ WARNING

To avoid personal injury or death, do not supply power to unit with compressor terminal box cover removed.

Be sure field wiring complies with local and national fire, safety, and electrical codes, and voltage to system is within limits shown on unit rating plate. Contact local power company for correction of improper voltage. See unit rating plate for recommended circuit protection device.

NOTE: Operation of unit on improper line voltage constitutes abuse and could affect unit reliability. See unit rating plate. Do not install unit in system where voltage may fluctuate above or below permissible limits.

NOTE: Use copper wire only between disconnect switch and unit.

NOTE: Install branch circuit disconnect of adequate size per NEC to handle unit starting current. Locate disconnect within sight from and readily accessible from unit, per Section 440-14 of NEC.

ROUTE GROUND AND POWER WIRES

Remove access panel and control box cover to gain access to unit wiring. Extend wires from disconnect through power wiring hole provided and into unit control box. Size wires per NEC but not smaller than minimum wire size shown in Product Data Sheet.

⚠ WARNING

The unit cabinet must have an uninterrupted or unbroken ground to minimize personal injury if an electrical fault should occur. The ground may consist of electrical wire or metal conduit when installed in accordance with existing electrical codes. Failure to follow this warning can result in an electric shock, fire, or death.

CONNECT GROUND AND POWER WIRES

Connect ground wire to ground connection in control box for safety. Connect power wiring to leads provided as shown in Fig. 7.

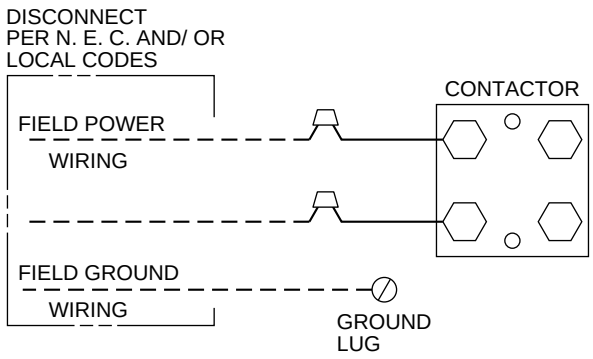


Fig. 7—Line Power Connections

CONNECT CONTROL WIRING

Route 24-v control wires through control wiring grommet and connect to leads provided in control box. (See Table 2 and Fig. 8.)

Use No. 18 AWG color-coded, insulated (35°C minimum) wire. If thermostat is located more than 100 ft from unit, as measured along the control voltage wires, use No. 16 AWG color-coded wire to avoid excessive voltage drop.

All wiring must be NEC Class 1 and must be separated from incoming power leads.

The outdoor unit requires a minimum of 27-va, 24-vac control power.

FINAL WIRING CHECK

IMPORTANT: Check factory wiring and wire connections to ensure terminations are secured properly. Check wire routing to ensure wires are not in contact with tubing, sheet metal, etc.

Step 9—Install Electrical Accessories

GENERAL

Refer to the individual instructions packaged with kits or accessories when installing.

⚠ CAUTION

Low-ambient kits are not available for 2-speed units. Do not attempt to operate unit below 55°F in cooling mode or modify control system for low-ambient operation. Compressor damage may occur.

Available electrical accessories include latent capacity control. See Table 2 and Fig. 8 for typical accessory wiring diagrams.

LATENT CAPACITY CONTROL (LCC)

The purpose of an LCC is to provide a dehumidification mode to assure a 75 percent or less system sensible heat ratio. If indoor unit installed contains an ICM blower (such as an FK4C fan coil or a 58UHV,58UXV or 58MVP gas furnace), no LCC is required. Indoor products with ICM blowers have enough CFM range to provide proper airflow for low-speed cooling. If indoor unit installed has a standard PSC blower motor, the low-speed airflow available is too great to assure 75 percent or less system sensible heat ratio. The LCC for standard blower products consists of a standard humidistat which opens contacts on humidity rise and a pilot duty relay with 24-v coil.

NOTE: If an LCC is desired, low-speed airflow must be maintained so that a minimum of 300 CFM/ton can be supplied during high-speed LCC operation.

LCC Operation for Typical PSC Fan Coils

The standard blower operation for systems with typical PSC fan coils is covered in Fig. 8A, B, and D. The blower runs in high speed regardless if compressor operation is high or low speed. When the LCC is wired according to Fig. 8A, B, or D and humidity rises, the humidistat contacts open and de-energize the relay. If relay is de-energized, the system operates on high-speed compressor and high-speed airflow until humidistat closes. Fig. 8C shows the wiring with a Carrier Thermidistat Control which controls temperature and humidity level without the need for an additional humidistat and relay.

LCC Operation for Typical PSC Furnaces

The standard blower operation of systems with typical PSC furnaces is covered in Fig. 8J, K, N, P, Q, or S. The blower runs in high or low speed in conjunction with compressor high- or low-speed operation. When the LCC is wired according to Fig. 8J, K, N, P, Q, or S and humidity rises, the humidistat contacts open and de-energize the relay. If relay is de-energized, the system operates on high-speed compressor and low-speed airflow until humidistat closes. Fig. 8L and R shows the wiring with a Carrier Thermidistat Control which controls temperature and humidity level without the need for an additional humidistat and relay.

Step 10—Make Airflow Selections

AIRFLOW SELECTION FOR 58UHV,58UXV FURNACES

The 58UHV,58UXV Non-Condensing Variable-Speed Furnaces provide high- and low-speed blower operation to match the

Table 2—Wiring Diagram Reference

INDOOR PRODUCT	THERMOSTAT	CONTROLS	DIAGRAM LETTER IN FIG. 8
Standard Fan Coil	Carrier Programmable (Model 2S)	Latent Capacity	A
	Carrier Non-Programmable (Model 2S)	Latent Capacity	B
	Carrier Thermidistat™ Control (Model RH)	Humidifier and Outdoor Sensor	C
	Other Brand Models	Latent Capacity	D
FK4C Fan Coil	Carrier Programmable (Model 2S)	—	E
	Carrier Non-Programmable (Model 2S)	—	F
	Carrier Thermidistat™ Control (Model RH)	Humidifier and Outdoor Sensor	G
	Other Brand Models	—	H
Single-Stage Furnace	Carrier Programmable (Model 2S)	Latent Capacity	J
	Carrier Non-Programmable (Model 2S)	Latent Capacity	K
	Carrier Thermidistat™ Control (Model RH)	Humidifier and Outdoor Sensor	L
	Carrier Dual Fuel Thermostat (Model DF)	Outdoor Sensor	M
	Other Brand Models	Latent Capacity	N
Two-Stage Furnace with PSC Blower Motor	Carrier Programmable (Model 2S)	Latent Capacity	P
	Carrier Non-Programmable (Model 2S)	Latent Capacity	Q
	Carrier Dual Fuel Thermostat (Model DF)	Outdoor Sensor	V
	Carrier Thermidistat™ Control (Model RH)	Humidifier and Outdoor Sensor	R
	Other Brand Models	Latent Capacity	S
Two-Stage Furnace with ICM Blower Motor	Carrier Programmable (Model 2S)	—	T
	Carrier Non-Programmable (Model 2S)	—	U
	Carrier Dual Fuel Thermostat (Model DF)	Outdoor Sensor	V
	Other Brand Models	—	W
Variable-Speed 80% Non-Condensing Furnace	Carrier Thermidistat™ Control (Model RH)	Humidifier and Outdoor Sensor	X
	Carrier Dual Fuel Thermostat (Model DF)	Outdoor Sensor	Y
Variable-Speed Condensing Furnace	Carrier Thermidistat™ Control (Model RH)	Humidifier and Outdoor Sensor	Z

capacities of compressor high and low speeds. To select recommended airflow, refer to Table 3 and the 58UHV,58UXV Installation Instructions. These settings are made on the furnace airflow selector board by moving the appropriate color-coded jumper wires. The ORANGE jumper wire should be set to the HP—EFFY position for heat pump best efficiency or HP—CMFT for heat pump enhanced comfort. The YELLOW COOL SIZE jumper is used to select airflow to match the needed tons of cooling. The BLUE CFM/TON jumper wire is used to select slight adjustments to airflow of 400, 350, or 315 CFM per ton. (See Table 3.)

AIRFLOW SELECTION FOR 58MVP FURNACES

The 58MVP Condensing Variable-Speed Furnaces provide high- and low-speed blower operation to match the capacities of compressor at high and low speeds. To select recommended airflow, refer to Table 4 and the 58MVP Installation Instructions. The 58MVP utilizes a control center that allows the installing technician to select proper airflows. For adjustments to the manual switches labeled A/C and CF and recommended switch positions, refer to Table 4. High-speed airflow is determined by the position of the A/C switches, and low-speed airflow is determined by the position of the CF switches. This furnace has a built-in, non-adjustable 90 sec off delay for cooling mode blower operation.

AIRFLOW SELECTION FOR FK4C OR 40FKA FAN COILS

The FK4C or 40FKA provides high- and low-speed blower operation to match the capacities of compressor at high and low speeds. To select recommended airflow, refer to Table 5 and the FK4C or 40FKA Installation Instructions. The FK4C or 40FKA utilizes an EASY SELECT control board that allows the installing technician to select proper airflows. The ORANGE SYSTEM TYPE jumper wire should be set to HP—EFF or HP—COMFORT. The BLUE AC/HP SIZE JUMPER is used to select airflow to match the outdoor unit nominal size in tons of cooling. The BLACK AC/HP CFM ADJUST jumper is used to make slight adjustments to the selected airflow tonnage. (See Table 5.) This fan coil has an adjustable blower off delay factory set at 90 sec for high- and low-speed blower operation.

Step 11—Start-Up

⚠ CAUTION

To prevent compressor damage or personal injury, observe the following:
- Do not overcharge system with refrigerant.
- Do not operate unit in a vacuum or at negative pressure.
- Do not disable low-pressure switch.

In scroll compressor applications:
- Dome temperatures may be hot.

⚠ CAUTION

To prevent personal injury wear safety glasses, protective clothing, and gloves when handling refrigerant and observe the following:
- Back seating service valves are not equipped with Schrader valves. Fully back seat (counter clockwise) valve stem before removing gage port cap.

⚠ CAUTION

Do not vent refrigerant to atmosphere. Recover during system repair or final unit disposal.

Follow these steps to properly start up the system:

1. The outdoor unit is equipped with a crankcase heater which operates at temperatures less than 75°F. If outdoor temperature is less than 75°F, energize crankcase heater 24 hr before starting unit. To energize heater only, set indoor thermostat to the OFF position and close power disconnect to the unit.
2. Fully back seat (open) liquid and vapor tube service valves.

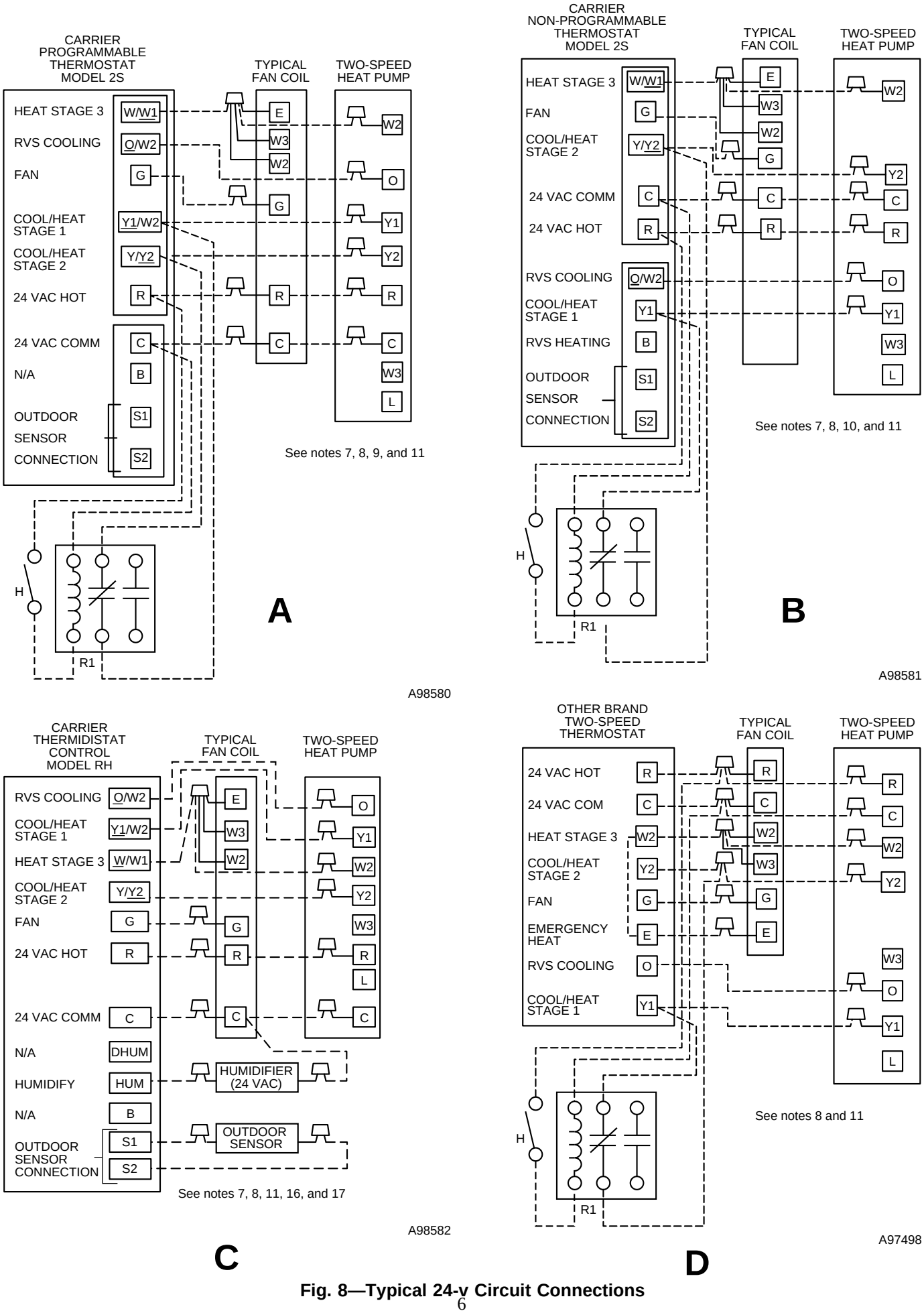
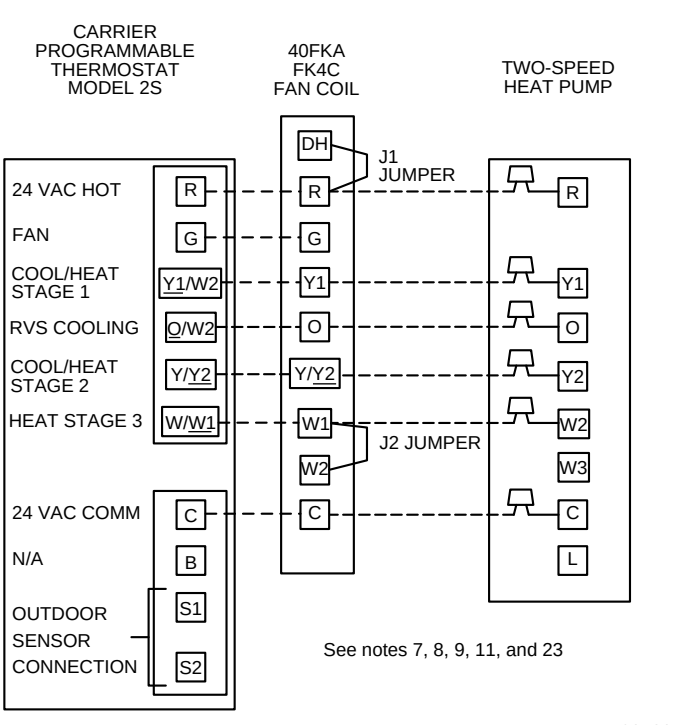


Fig. 8—Typical 24-v Circuit Connections



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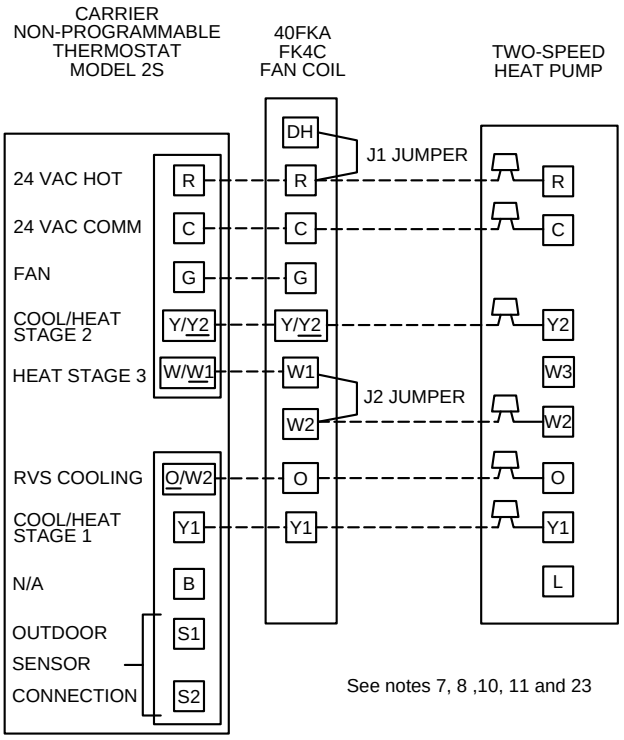

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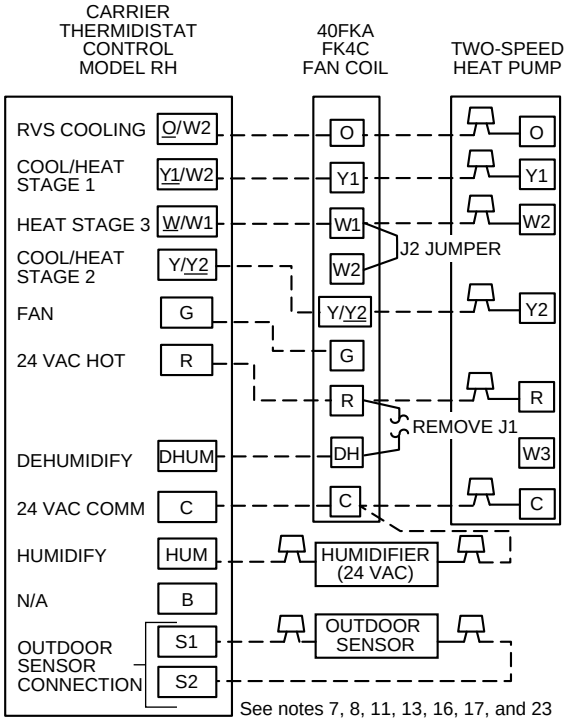

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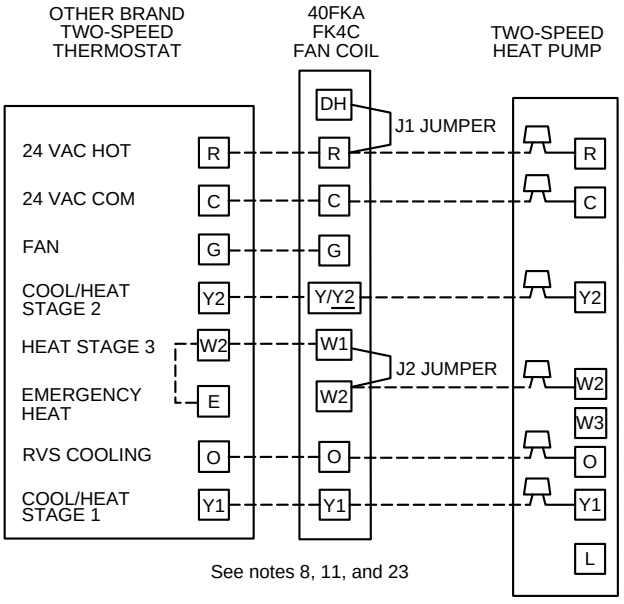

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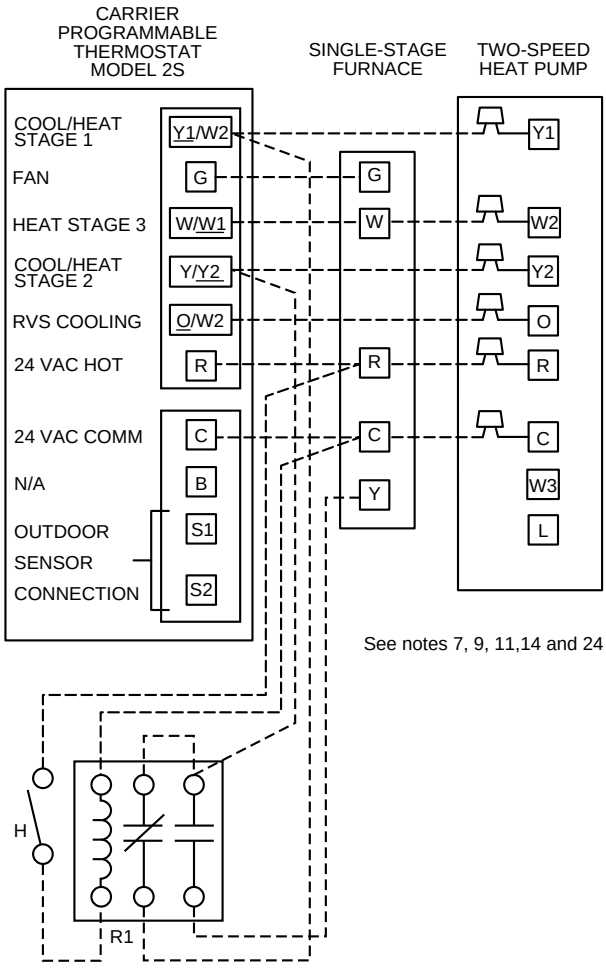
Fig. 8—Typical 24-v Circuit Connections (Continued)



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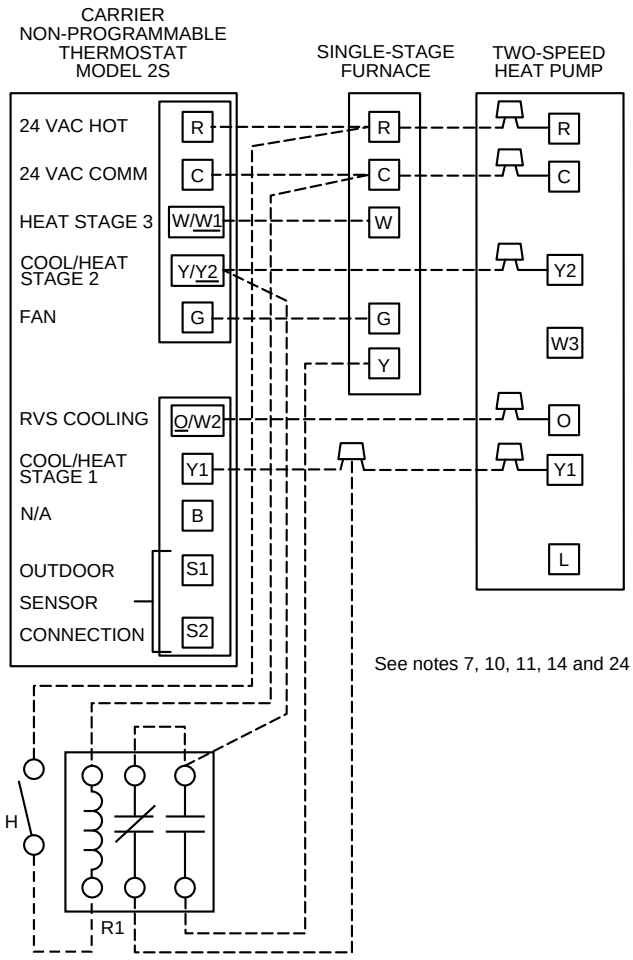

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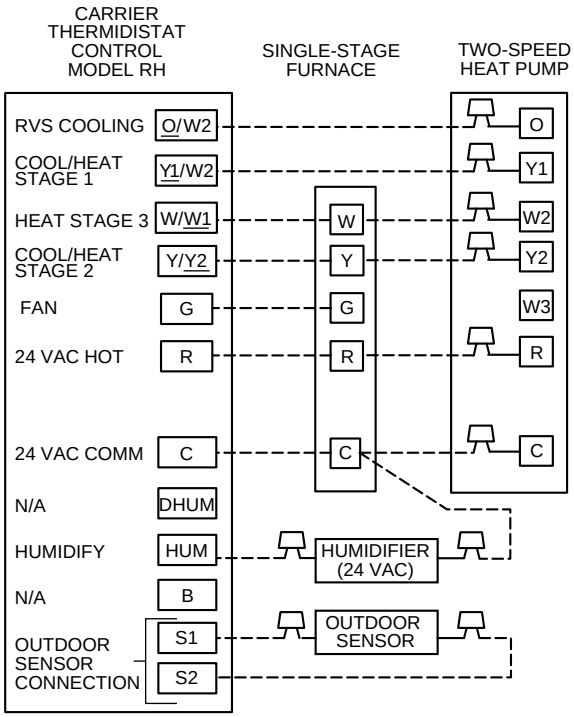
Fig. 8—Typical 24-v Circuit Connections (Continued)



See notes 7, 11, 14, 15, 16, 17, 18 and 25

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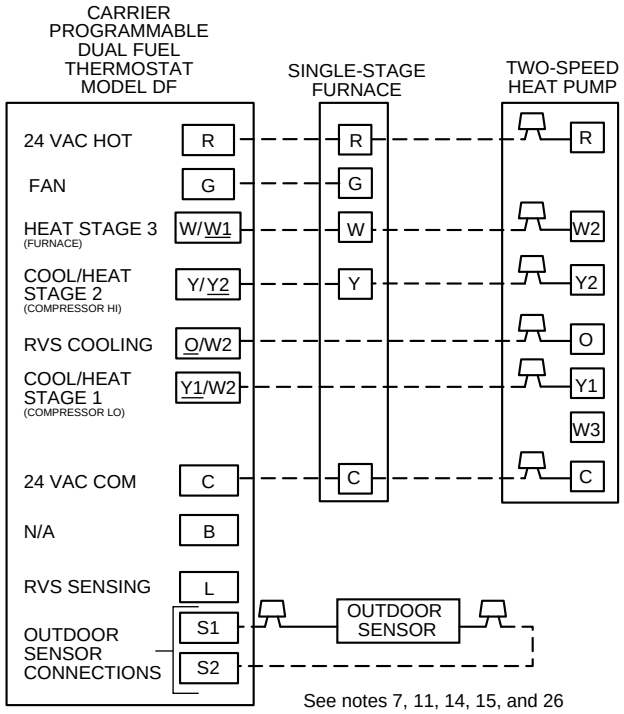

See notes 7, 11, 14, 15, and 26

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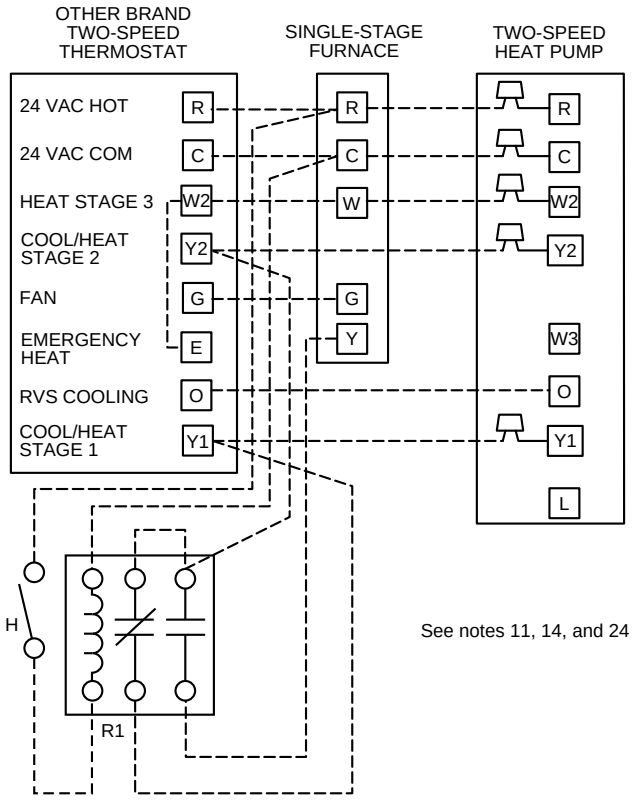

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Fig. 8—Typical 24-v Circuit Connections (Continued)

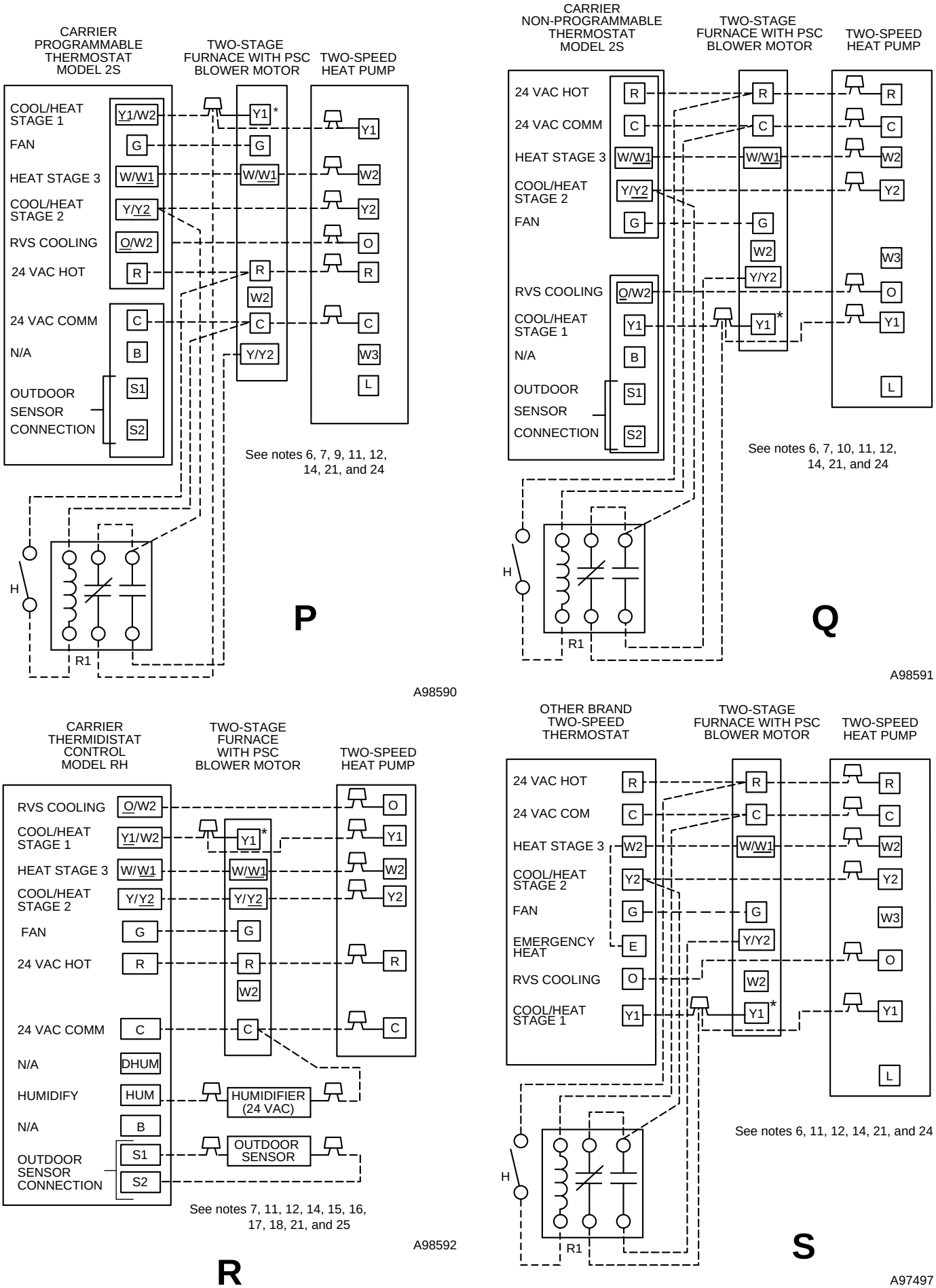
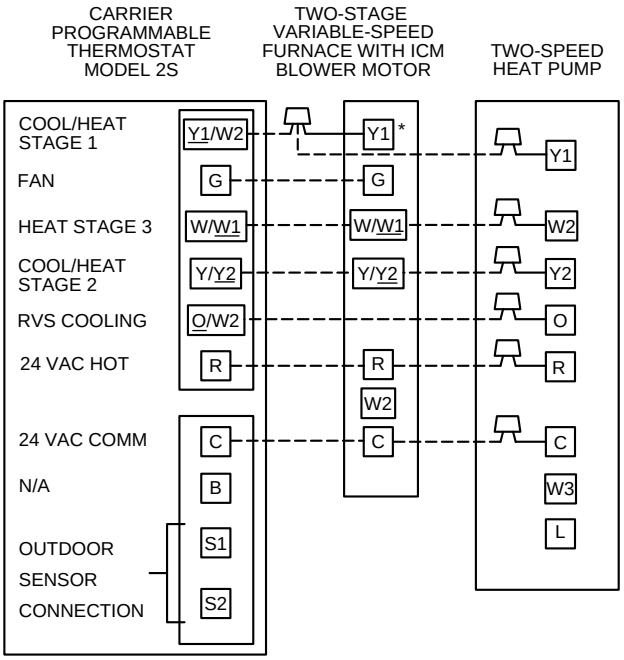


Fig. 8—Typical 24-v Circuit Connections (Continued)



See notes 6, 7, 9, 11, 12, 14, 21 and 24

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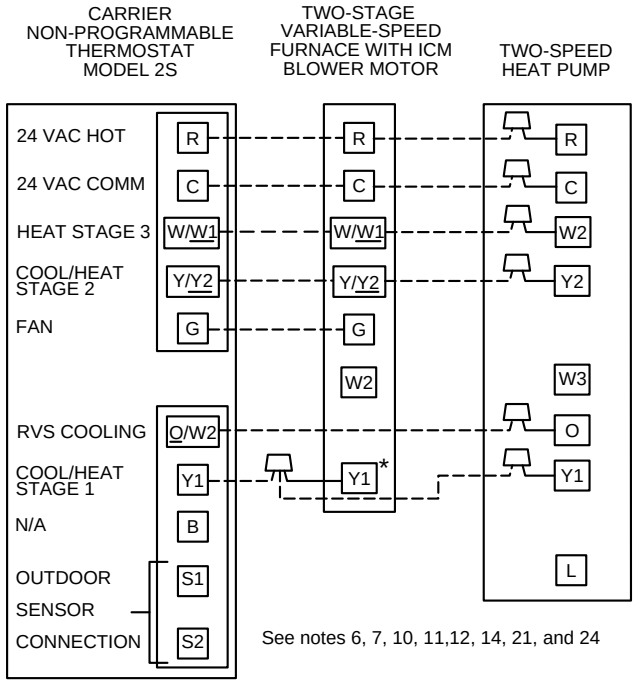

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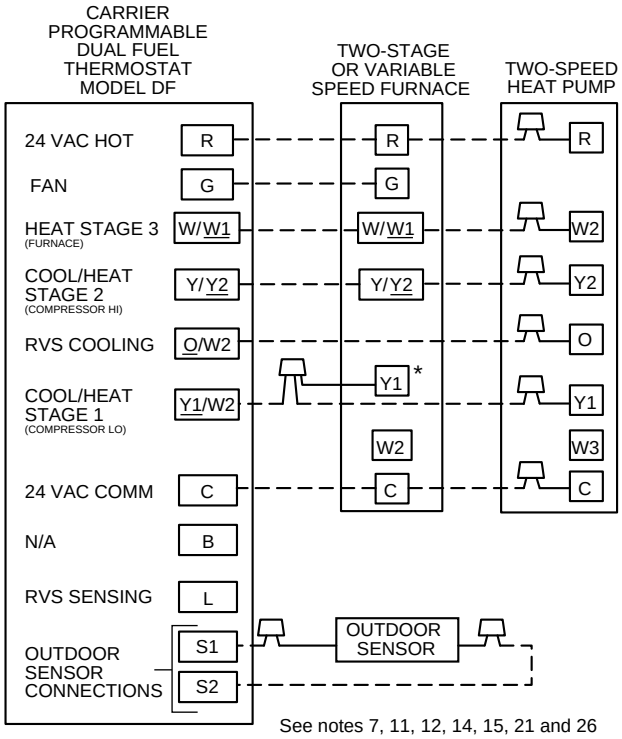

See notes 7, 11, 12, 14, 15, 21 and 26

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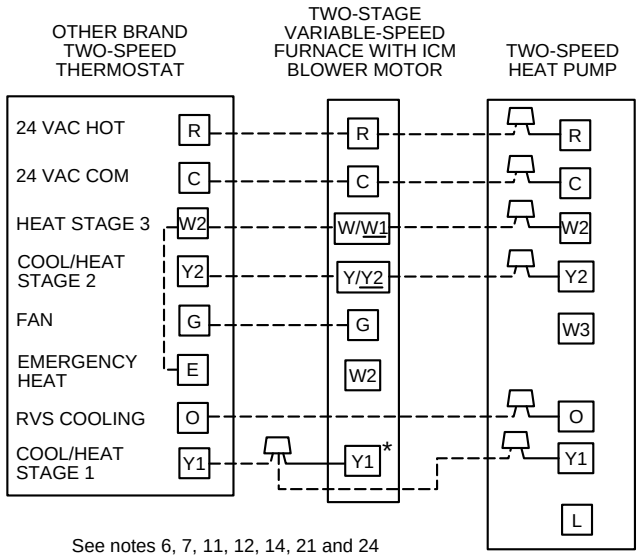

See notes 6, 7, 11, 12, 14, 21 and 24

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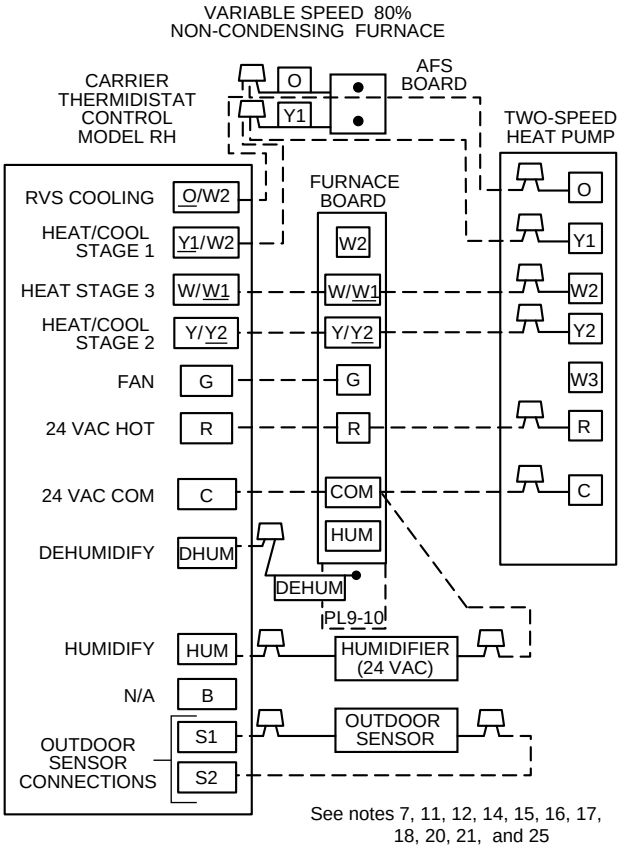
W

Fig. 8—Typical 24-v Circuit Connections (Continued)



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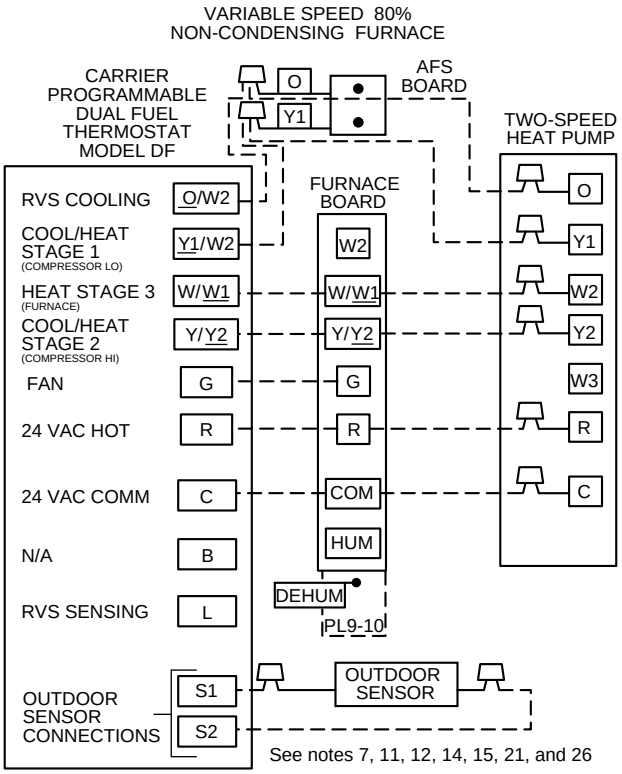

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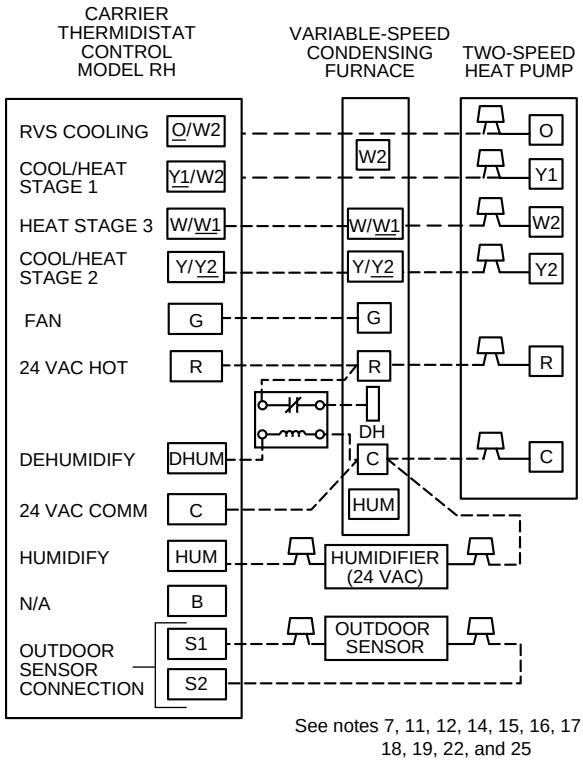

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Fig. 8—Typical 24-v Circuit Connections (Continued)

WIRING DIAGRAM NOTES:

1. Carrier thermostat wiring diagrams are only accurate for model numbers TSTAT _ _ _ _ _ _ _.
2. Wiring must conform to NEC or local codes.
3. Connect 24-v field wiring to factory-provided stripped leads.
4. Thermostats are factory configured with 5-minute compressor cycle protection and 4 cycles per hour limit. See thermostat Installation Instructions for details.
5. To stage electric resistance heat, consult outdoor thermostat Installation Instructions.
6. Terminals marked with an * may not be present on equipment.
7. Underlined letter on dual terminal indicates its usage.

   For example: O/W2 means O is energized in cooling mode.
8. Refer to fan coil Installation Instructions for features and additional wiring information.
9. Programmable model 2S, when used in heat pump installations (Switch C OFF), uses O/W2 to control reversing valve.
10. Non-programmable model 2S, when used in heat pump installations (Jumper R19 NOT cut), uses O/W2 to control reversing valve.
11. Select the ZONE position on 2-speed heat pump control board. In heating mode, this allows Y1 to control low-speed compressor operation and Y2 to control high-speed compressor operation.
12. Furnace must control its own second-stage operation via furnace control algorithm. Refer to furnace Installation Instructions for proper setup.
13. To activate dehumidify function on FK4C or 40FKA, remove J1 jumper at fan coil control board.
14. Heat pump MUST have a high-pressure switch for dual fuel applications.
15. Outdoor air temperature sensor must be attached in all dual fuel applications.
16. Thermidistat Dip Switch 1 should be set in the ON position for heat pump installations.
17. Thermidistat Dip Switch 2 should be set in the ON position for 2-speed compressor operation.
18. Thermidistat Configuration Option No. 10 "Dual Fuel Selection" must be turned on in all dual fuel applications.
19. To activate dehumidify feature on current style 58MVP variable-speed furnaces, a pilot duty, 24-v relay must be used.
20. To activate dehumidify feature on current style 58UHV,58UXV variable-speed 80% non-condensing furnaces, disconnect green (dehum) wire from G on furnace control board and connect to dehumidify terminal dhu on thermidistat.
21. See Table 3—Airflow Selection for 58UHV,58UXV Furnaces.
22. See Table 4—Airflow Selection for 58MVP Furnaces.
23. See Table 5—Airflow Selection for FK4C or 40FKA Fan Coil.
24. Select Furnace Interface Option, Balance Point, and Defrost Time on 2-speed heat pump control board.
25. Thermidistat controls dual fuel operation; do not select Furnace Interface Option on 2-speed heat pump control board.
26. Dual fuel thermostat Dip Switch D should be set in the ON position for 2-speed compressor operation. This thermostat controls dual fuel operation; do not select Furnace Interface Option on 2-speed heat pump control board.

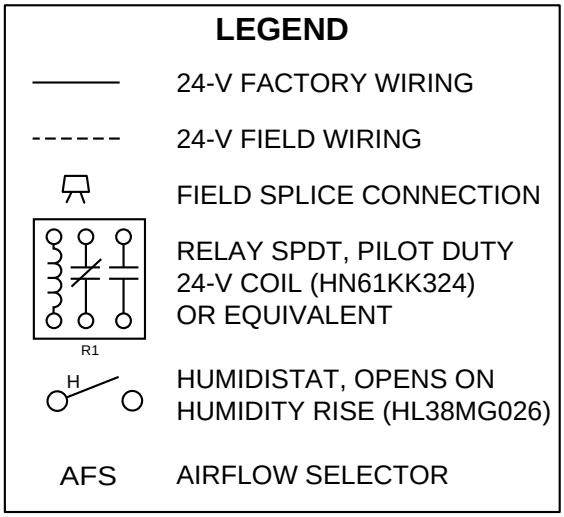

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Table 3—Airflow Selection for 58UHV,58UXV Furnaces (CFM)

38YDA UNIT SIZE	FURNACE MODEL/HEATING SIZE	FURNACE AIRFLOW SELECTION BOARD SETTINGS									
		Cool Size Jumper Position	AC/HP Jumper Position	Cool CFM Per Ton Jumper Position					
				400		350		315	
				Heat Pump Heating Airflow*					
				High	Low	High	Low	High	Low
036	060	HI	HP—EFFY	1260	780	1100	680	990	585
			HP—CMFT	1135	700	990	610	895	555
	080	M-LO	HP—EFFY	1260	790	1100	700	990	625
			HP—CMFT	1135	715	990	630	895	560
	100	LO	HP—EFFY	1260	780	1090	775	990	700
			HP—CMFT	1130	700	980	700	890	700
	120	LO	HP—EFFY	1195	865	1085	785	985	785
			HP—CMFT	1075	780	975	750	885	750
048	080	HI	HP—EFFY	1635	1040	1470	915	1325	820
			HP—CMFT	1510	940	1325	825	1190	740
	100	M-HI	HP—EFFY	1680	1040	1465	915	1325	820
			HP—CMFT	1510	935	1320	825	1190	740
	120	M-HI	HP—EFFY	1650	1070	1465	975	1315	930
			HP—CMFT	1485	965	1320	880	1185	835
060	100	HI	HP—EFFY	2085	1300	1840	1150	1655	1025
			HP—CMFT	1890	1170	1655	1035	1490	920
	120	HI	HP—EFFY	2110	1300	1865	1140	1640	1080
			HP—CMFT	1900	1170	1650	1025	1475	970

* Heat Pump Cooling Airflow always matches HP—EFFY Heat Pump Heating Airflow.

Table 4—Airflow Selection for 58MVP Furnaces (CFM)

38YDA UNIT SIZE	HIGH-SPEED A/C SETUP SWITCH POSITION			FURNACE MODEL/HEATING SIZE						LOW-SPEED CF SETUP SWITCH POSITION		
				060		080		100				
	A/C-1	A/C-2	A/C-3	High	Low	High	Low	High	Low	CF-1	CF-2	CF-3
036	OFF	OFF	ON	1200	800	1200	800	1200	800	OFF	ON	OFF
048	OFF	ON	ON	—	—	—	—	1600	1000	ON	ON	OFF
060	OFF	ON	ON	—	—	—	—	1600*	1000	ON	ON	OFF

* Efficiency rating obtained at 1600 CFM. If 2000 CFM is desired, adjust airflow per 58MVP Installation Instructions.

Table 5—Airflow Selection for FK4C or 40FKA Fan Coils (CFM)

38YDA UNIT SIZE	FK4C UNIT SIZE	EASY SELECT CONTROL BOARD			HEATING CFM*		COOLING CFM*	
		AC/HP SIZE (Blue Wire)	AC/HP CFM ADJUST (Black Wire)	SYSTEM TYPE (Orange Wire)	High	Low	High	Low
036	001	036	NOM	HP—EFF	1100	680	1100	680
				HP—COMFORT	990	615		
	002	036	NOM	HP—EFF	1100	680	1100	680
				HP—COMFORT	990	615		
	003	036	NOM	HP—EFF	1100	680	1100	680
				HP—COMFORT	990	615		
	005	036	NOM	HP—EFF	1100	680	1100	680
				HP—COMFORT	990	615		
	006	036	NOM	HP—EFF	1100	745	1100	745
				HP—COMFORT	990	670		
048	005	048	NOM	HP—EFF	1470	910	1470	910
				HP—COMFORT	1320	820		
	006	048	NOM	HP—EFF	1470	995	1470	995
				HP—COMFORT	1325	895		
060	006	060	NOM	HP—EFF	1835	1240	1835	1240
				HP—COMFORT	1655	1120		

* Airflow CFMs are given with AC/HP CFM ADJUST jumper set at NOM. Airflow can be adjusted +15% or -10% by selecting HI or LO respectively.

3. Unit is shipped with valve stem(s) front seated and caps installed. Replace stem caps after system is opened to refrigerant flow (back seated). Replace caps finger tight and tighten additional 1/12 turn (20 ft-lb torque) with wrench.
4. Close electrical disconnects to energize system.
5. Set room thermostat at desired temperature. Be sure the set point is below indoor ambient and is set low enough to energize desired speed.

NOTE: Carrier electronic thermostats are equipped with a 15-minute staging timer. This timer prevents the 2-speed system from operating at high speed until unit has been operating in low speed for 15 minutes unless there is at least a 5°F difference between room temperature and thermostat set point. To force high speed (after a minimum of 2 minutes in low speed), adjust the set point at least 5° below room ambient for cooling or 5° above room ambient for heating.

6. Set room thermostat to COOL or HEAT and fan control to AUTO or ON as desired. Wait for the appropriate time delay(s) and the 2-minute minimum low-speed run time. Operate unit for 15 minutes. Check refrigerant charge.

Step 12—Check Charge

⚠ WARNING

Service valve gage ports are not equipped with Schrader valves. To prevent personal injury, make sure gage manifold is connected to the valve gage ports before moving valves off fully back seated position. Wear safety glasses and gloves when handling refrigerant.

UNIT CHARGE

Factory charge is shown on unit rating plate. To check charge in cooling mode, refer to Cooling Only Procedure. To check charge in heating mode, refer to Heating Check Chart Procedure.

NOTE: When 2-speed unit is operating in low-speed cooling, system vapor (suction) pressure will be higher than a standard single-speed system or high-speed operation. This normal operation is due to the reduced capacity operating with typically larger indoor and outdoor coils.

Adjust charge in both heating and cooling by following procedure shown on charging tables located on unit information plate on back side of access panel.

COOLING ONLY PROCEDURE

1. Operate unit a minimum of 10 minutes before checking charge.
2. Measure liquid service valve pressure by attaching an accurate gage to service port.
3. Measure liquid line temperature by attaching an accurate thermistor type or electronic thermometer to liquid line near outdoor coil.
4. Refer to unit rating plate for required subcooling temperature.
5. Refer to Table 6. Find the point where required subcooling temperature intersects measured liquid service valve pressure.
6. To obtain required subcooling temperature at a specific liquid line pressure, add refrigerant if liquid line temperature is higher than indicated or reclaim refrigerant if temperature is lower. Allow a tolerance of ± 3°F.

HEATING CHECK CHART PROCEDURE

To check system operation during heating cycle, refer to the Heating Check Chart on outdoor unit. This chart indicates whether a correct relationship exists between system operating pressure and air temperature entering indoor and outdoor units. If pressure and temperature do not match on chart, system refrigerant charge may not be correct. Do not use chart to adjust refrigerant charge.

Table 6—Required Liquid-Line Temperature (°F)

LIQUID PRESSURE AT SERVICE VALVE (PSIG)	REQUIRED SUBCOOLING TEMPERATURE (°F)			
	5	10	15	20
134	71	66	61	56
141	74	69	64	59
148	77	72	67	62
156	80	75	70	65
163	83	78	73	68
171	86	81	76	71
179	89	84	79	74
187	92	87	82	77
196	95	90	85	80
205	98	93	88	83
214	101	96	91	86
223	104	99	94	89
233	107	102	97	92
243	110	105	100	95
253	113	108	103	98
264	116	111	106	101
274	119	114	109	104
285	122	117	112	107
297	125	120	115	110
309	128	123	118	113
321	131	126	121	116
331	134	129	124	119
346	137	132	127	122
359	140	135	130	125

NOTE: When charging is necessary during heating season, charge must be weighed in accordance with unit rating plate ± 0.6 oz/ft of 3/8-in. liquid line above or below 15 ft respectively.

EXAMPLE:

To calculate additional charge required for a 25-ft line set:

25 ft - 15 ft = 10 ft X 0.6 oz/ft = 6 oz of additional charge

Step 13—System Functions and Sequence of Operation

The outdoor unit control system has special functions. The following is an overview of the 2-speed control functions:

COOLING OPERATION

This product utilizes a 2-stage cooling indoor thermostat. With a call for first stage cooling (Y1), the outdoor fan and low-speed compressor are energized. If low speed cannot satisfy cooling demand, high speed is energized (Y1 and Y2) by the second stage of indoor thermostat. After second stage is satisfied, the unit returns to low-speed operation until first stage is satisfied or until second stage is required again.

HEATING OPERATION

This product utilizes a 2-stage heating indoor thermostat. The first stage of heating is heat pump operation (Y1), while auxiliary or back up heat is controlled by second stage (W2). The control board determines speed of heat pump operation. See Table 7 for ambients at which high-speed and low-speed operations occur.

NOTE: The values in Table 7 are valid unless the ZONE option has been selected on the 2-speed control board STAGE 2 LATCH pot. See Zoning Selection section for details.

Table 7—Ambient Temperatures for High- and Low-Speed Operation

UNIT SIZE	AMBIENT TEMPERATURE (°F)	
	High Speed	Low Speed
036	30 or less	31 or greater
048	33 or less	34 or greater
060	40 or less	41 or greater

LED FUNCTION LIGHTS

System control function LED indicator lights are available at outdoor unit 2-speed control board. The indoor thermostat may provide indicator signals for high- and low-speed operation, system malfunction, and auxiliary heat (if equipped to do so). The 2-speed control board has an LED which provides signals for several system operations. See Table 8 for LED functions and definitions. Table 8 also provides the order of signal importance if more than 1 signal should occur. If equipped and properly wired, the signal to indoor thermostat is supplied by the low-voltage L lead.

NOTE: A signal (code) is not sent through the L lead to thermostat unless a failure has occurred.

Table 8—LED Control Function Light Code

CODE	DEFINITION	*
Constant flash No pause	No demand Stand by	9
1 flash w/pause	Low-speed operation	8
2 flashes w/pause	High-speed operation	7
3 flashes w/pause	Outdoor ambient thermistor failure	6
4 flashes w/pause	Outdoor coil thermistor failure	5
3 flashes pause 4 flashes	Thermistor out of range†	4
5 flashes w/pause	Pressure switch trip (LM1/LM2)	3
6 flashes w/pause	Compressor PTC's out of limit	2
Constant light No pause No flash	Board failure	1

* Function light signal order of importance in case of multiple signal request; 1 is most important.
† Check both thermistors to determine which is faulty.

FACTORY DEFAULTS

Factory defaults have been provided in the event of failure of ambient thermistor, outdoor coil thermistor, and/or furnace interface jumper. Refer to Table 9 for default and function.

THREE-SEC TIME DELAY

Any time the control receives a 24-v input, such as Y1 or Y2, there is a 3-sec time delay before control function is initiated. This helps prevent nuisance trips from thermostat jiggling.

ONE-MINUTE SPEED CHANGE TIME DELAY

When compressor changes speeds from high to low or low to high, there is a 1-minute time delay before compressor restarts. The outdoor fan motor remains running.

FIVE-MINUTE TIME DELAY

The 2-speed control logic contains a 5-minute time delay that prevents unit from short cycling after a thermostat off cycle or power interruption. The unit can be forced to operate immediately by momentarily touching a jumper between speed-up terminals of control board. (See Fig. 9.) The speed-up feature does not bypass any other function or time delay.

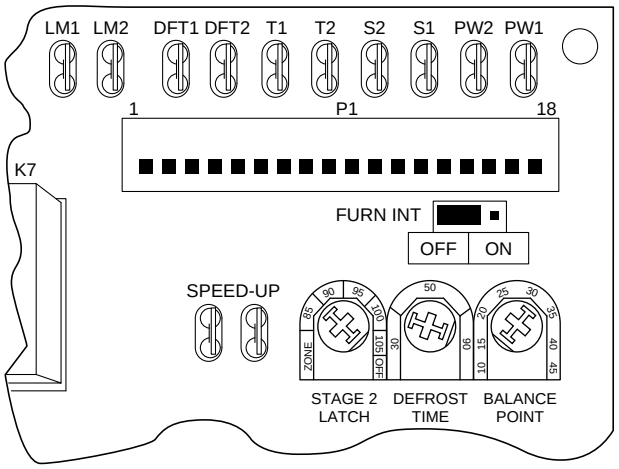

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Fig. 9—Two-Speed Control Board

TWO-MINUTE LOW-SPEED MINIMUM

If unit has not operated within the past 30 minutes, upon the next thermostat high- or low-speed demand, unit operates for a minimum of 2 minutes in low speed.

CRANKCASE HEATER OPERATION

The 2-speed control energizes crankcase heater during unit's off cycle when outdoor ambient is below 75°F.

OUTDOOR FAN MOTOR OPERATION

The 2-speed control energizes outdoor fan any time compressor is operating. The outdoor fan remains energized during the 1-minute speed change time delay and if a pressure switch or positive temperature coefficient (PTC) overload should trip.

After termination of a defrost cycle, the outdoor fan delays coming on for 20 sec. This allows refrigerant system to recover outdoor coil heat and minimize the "steam cloud" effect.

SECOND-STAGE LATCHING

Mechanical thermostats operate with a staging differential of 2°F (droop). Carrier electronic thermostats are droopless, meaning that they maintain room temperature at set point without latching second stage. If system is installed with a mechanical thermostat or second stage latching is desired, the following information applies.

During normal operation, the compressor operates at low speed to satisfy first stage of indoor thermostat. If indoor thermostat temperature increases 2 degrees, the compressor shifts into high-speed operation. When indoor thermostat temperature is satisfied, the compressor returns to low-speed, first-stage operation.

The installing technician can select high-speed compressor operation until first stage of indoor thermostat is satisfied. This eliminates the temperature droop of indoor thermostat between first- and second-stage operation and holds room temperature closer to set point when load requirements are high. To select this option, rotate the STAGE 2 LATCH potentiometer (pot) to desired temperature. (See Fig. 10.) The pot is factory set at OFF; however, a temperature of 85°, 90°, 95°, 100°, or 105°F can be selected. The selected temperature is the outdoor temperature at which the structure's cooling load requires high-speed operation.

Unit high- and low-speed capacities should be plotted versus cooling load (heat gain) of structure to accurately determine the STAGE 2 LATCH temperature to be selected. Unit capacities

Table 9—Factory Defaults

FAILED COMPONENT	FUNCTION	DEFAULT
Ambient Thermistor	Crankcase Heater	Energized during any off cycle
	Second-Stage Latching	Does not function
	Furnace Interface	Balance point does not function, but interface still energizes furnace and locks out heat pump with a call for W2
	Heating Switchover Speed Point	Unit only runs in high compressor speed
	Defrost Initiation	Defrost is initiated based on coil temperature only
	Outdoor Thermostat for Auxiliary Heat	Anytime there is a call for W2, W3 is also energized
Outdoor Coil Thermistor	Defrost Initiation and Termination	Defrost occurs at each time interval, but terminates after 5 minutes
Furnace Interface Jumper	Furnace Interface	Does not function

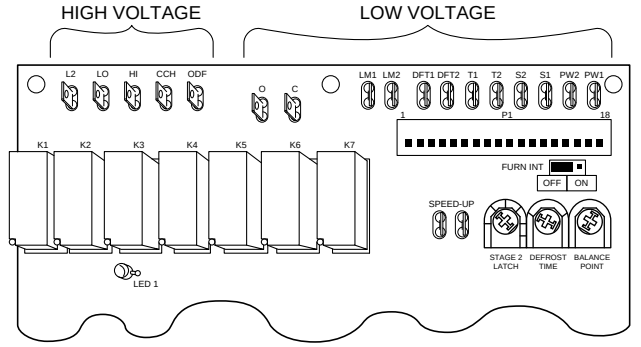

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Fig. 10—LED and Potentiometer Location

versus outdoor temperature can be found in the unit Product Data Sheet. The cooling load must be taken from structure's heat gain/loss calculations. The selected temperature is the point at which high-speed capacity is needed and is just above the low-speed balance point. (See Fig. 11.)

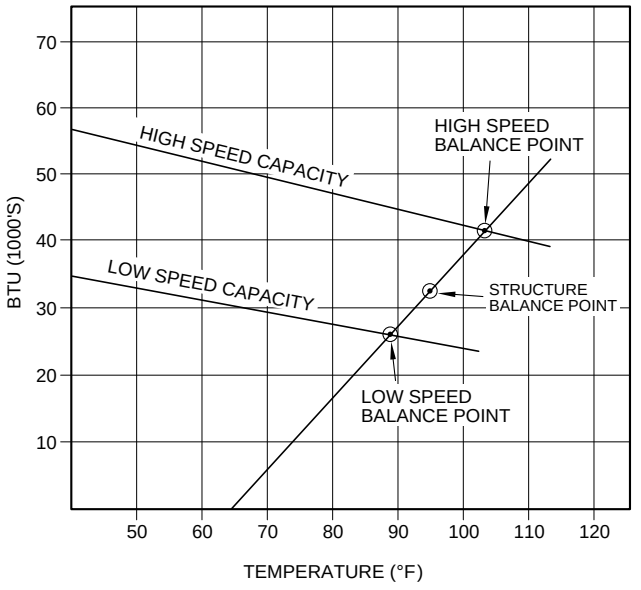

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Fig. 11—Typical Cooling Balance Points

After temperature is selected, unit operates in high speed during first-stage demand at any temperature at or above the setting.

ZONING SELECTION

If the STAGE 2 LATCH pot is set to the ZONE position, compressor operating speed in either heat or cool mode is determined by Y1 and/or Y2 inputs. The system operates in low speed with a Y1 input and high speed with a Y2, or Y1 and Y2 input. This allows the multistage zoning system to determine what heating speed is needed regardless of outdoor temperature or switchover point.

DEFROST TIME SELECTION

The defrost interval can be field selected, dependent on local or geographical requirements. It is factory set at 90 minutes but can be changed to either 30 or 50 minutes by rotating DEFROST TIME pot. (See Fig. 9.)

DEFROST

The 2-speed control logic for defrost function is the standard time and temperature initiated, time or temperature terminated. Defrost only occurs at outdoor temperatures less than 50°F. The control initiates defrost when outdoor coil thermistor is 30°F (± 2°) or less, and selected defrost time (interval) has been accumulated during unit operation. Termination occurs when coil thermistor reaches 80°F (± 5°) or defrost period reaches a maximum of 10 minutes.

Defrost is always done in high speed, even if unit operation requires low speed, unless zoning is selected. During defrost, unit operates in high speed, energizes reversing valve O and auxiliary heat W2, and de-energizes outdoor fan. Upon termination, there is a 20-sec delay in outdoor fan being energized.

FIELD-INITIATED FORCED DEFROST

By placing a jumper across speed-up terminals for a minimum of 5 sec and then removing it, a defrost cycle can be initiated. (See Fig. 9.) The cycle occurs only if outdoor ambient is less than 50°F, regardless of outdoor coil temperature. The cycle terminates when coil thermistor reaches 80°F (± 5°) or defrost period reaches a maximum of 10 minutes.

FURNACE INTERFACE

This feature provides a heat pump lockout upon a demand for auxiliary heat W2 and must be used when interfacing a heat pump with a gas/oil furnace. Field selection of furnace interface FURN INT option is done by connecting factory-supplied jumper to ON position of terminal 3 connector. (See Fig. 9.)

NOTE: Do not select the Furnace Interface Option if using a Carrier Dual Fuel thermostat or the Thermidistat Control.

When this option is selected, heat pump is locked out of operation any time there is a thermostat call for W2, or outdoor ambient is below balance point pot setting. (See Fig. 9.) When unit requires defrost, auxiliary heat W2 energizes the furnace. After defrost is terminated, heat pump shuts down and furnace continues to operate until thermostat is satisfied. To utilize this function, the economic and/or thermal balance point must be determined. See appropriate heat pump balance point worksheet in unit Product Data Sheet.

BALANCE POINT

This feature can be used in 2 different options: furnace interface or electric heat staging. Refer to the Furnace Interface section for its application. If heat pump is installed with a fan coil with multistages of electric heat, this option can be used to stage the banks of heat by outdoor ambient. This eliminates the need for accessory outdoor thermostats.

When using this option to stage electric heat, the first stage is energized by a W2 demand, and second stage is energized by a W3 demand. Select the W3 desired temperature by rotating BALANCE POINT pot. (See Fig. 9 or 11.) Temperatures that may be selected are 10°, 15°, 20°, 25°, 30°, 35°, 40°, and 45°F. The pot is factory set at 45°F.

LOW-SPEED HEATING WITH AUXILIARY HEAT

If system is operating in low-speed heating and there is a demand for auxiliary heat (W2), the system changes to high-speed operation. W2 is energized unless low-voltage control wiring is configured as shown in Fig. 12.

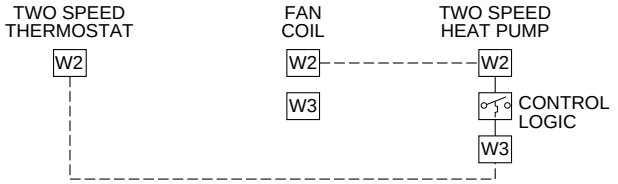

Fig. 12—Low-Voltage Control Wiring

AUXILIARY HEAT (W2) LOCKOUT

In some areas, it is necessary to disable auxiliary heat, except for defrost, until outdoor ambient is less than the structure's balance point. This is accomplished by using the low-voltage wiring shown in Fig. 12. Wire the 24-vac W2 signal from indoor thermostat to W3 of control, and W2 of control to W2 of indoor unit. When outdoor ambient is less than setting of BALANCE POINT pot, the 24-vac signal energizes auxiliary heat (W2) of indoor unit.

EMERGENCY HEAT

If the 2-speed control receives a call for auxiliary heat (W2) without a heat pump heating (Y1) call, second auxiliary stage (W3) is energized. This ensures all available heat is energized if indoor thermostat is switched to emergency heat.

COMPRESSOR PTC OVERLOAD PROTECTION

The control senses the resistance of the compressor internal positive temperature coefficient (PTC) overloads. If PTC resistance is out of range, control shuts unit off until resistance range is acceptable. See Table 10 for compressor PTC ranges.

Table 10—Compressor PTC Ranges

COMPRESSOR INTERNAL PTC RESISTANCE	
Safe range (77°F)	1.5k to 7.8k ohms
To trip	26k to 34k ohms
To reset	8.4k to 10k ohms

When control turns outdoor unit off due to out of range PTCs, unit remains off for 15 minutes with outdoor fan running. After 15 minutes, control checks resistance every 5 minutes until it reaches reset range. During this time, a malfunction signal appears at control board. If a PTC trip occurs 3 times, the control locks out outdoor unit operation and provides a malfunction signal at control.

PRESSURE SWITCH PROTECTION

The outdoor unit is equipped with high- and low-pressure switches, wired in series. If the control senses the opening of a pressure switch, it provides a 5-minute time delay in outdoor unit operation with outdoor fan running. A malfunction signal appears on control when pressure switch opens. If pressure switch remains open for 1 hr or longer, a malfunction signal is provided at L terminal on indoor thermostat.

MAJOR COMPONENTS

2-Speed Control

The 2-speed control board controls the following functions:

- High- and low-compressor contactor operation
- Outdoor fan motor operation
- Crankcase heater operation
- Compressor protection
- Pressure switch monitoring
- Second-stage latching
- Time delays
- Time/temperature defrost
- Defrost interval selection
- Zoning
- Furnace interface
- Electric heat staging

Refer to other headings in the System Functions and Sequence of Operation section for individual function information.

Header Pin Housing

The header pin housing is the plastic assembly which holds the stripped lead ends for field connections. The 2-speed control receives 24-vac low-voltage control system inputs through the housing/pins. The housing also contains jumpers which the control uses for system configuration, such as heat pump versus air conditioner. Refer to Fig. 13 for header pin housing configuration.

2-Speed Compressor

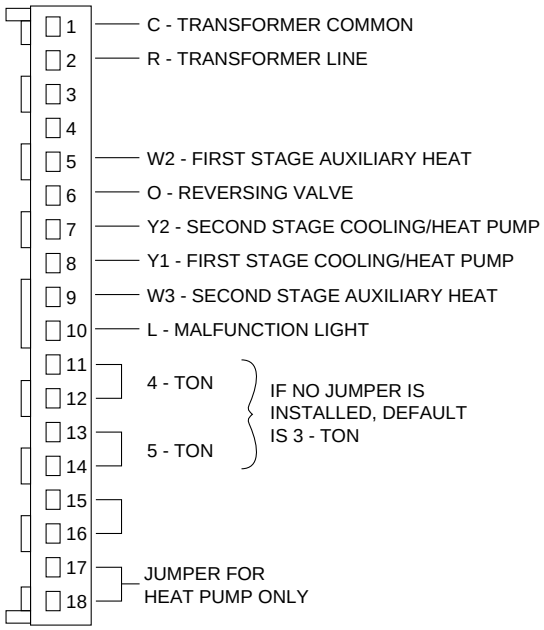

Fig. 13—Header Pin Housing Configuration

The 2-speed compressor contains motor windings that provide low-speed, 4 pole (1750 RPM) and high-speed, 2-pole (3500 RPM) operation. Refer to Table 11 for appropriate winding resistances. Refer to unit wiring label for winding configurations.

Table 11—Two-Speed Compressor (Winding Resistance at 70°F ± 20°)

WINDING	3 TON	4 TON	5 TON
T1-T2	0.80	0.70	0.60
T1-T3	3.20	2.20	1.80
T1-T7	1.30	1.00	1.00
T1-T8	3.10	2.20	2.00

The 2-speed compressor is protected by an internal pressure relief (IPR) which relieves discharge gas into compressor shell when differential between suction and discharge pressures exceeds 500 psi.

The compressor is also protected by 3 PTC devices attached to motor windings. The PTC resistance is sensed by the 2-speed control. See Table 10 for resistance ranges.

Mechanically Interlocked Contactors

⚠ WARNING

Interlocked contactor coils are 240v, high voltage. Electrical shock can cause personal injury or death.

⚠ CAUTION

Do not bypass interlocks of contactors, as compressor damage will occur.

The 2-speed products are equipped with mechanically interlocked contactors. Each contactor has interconnecting linkage, providing independent interlocks.

The 2-speed control provides the electrical interlock. The contactors are supplied with 240-v coils, which reduce the va requirements of low-voltage (24-vac) control system.

Temperature Thermistors

Thermistors are electronic devices which sense temperature. As the temperature increases, the resistance decreases. A thermistor is used to sense outdoor ambient. Refer to Fig. 14 for resistance values versus temperature.

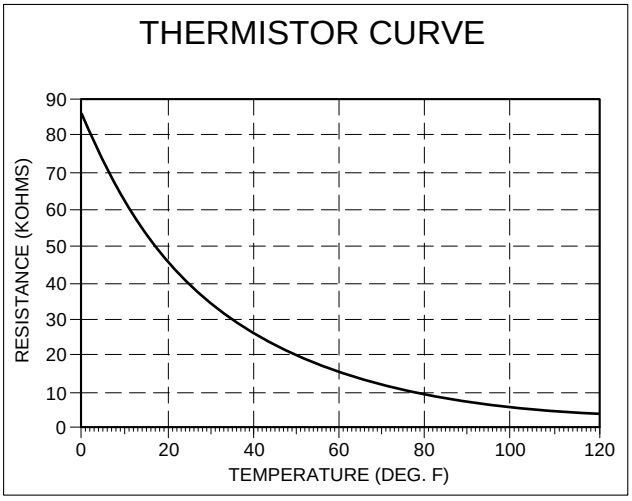

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Fig. 14—Resistance Values Versus Temperature

If outdoor ambient thermistor should fail, a malfunction signal appears at 2-speed control. The control does not initiate second-stage latching, and crankcase heater is turned on during all off cycles.

Step 14—Final Checks

IMPORTANT: Before leaving job, be sure to do the following:

1. Securely fasten all panels and covers.
2. Tighten service valve stem caps to 1/12-turn past finger tight.
3. Leave User's Manual with owner. Explain system operation and periodic maintenance requirements outlined in manual.

CARE AND MAINTENANCE

For continuing high performance and to minimize possible equipment failure, periodic maintenance must be performed on this equipment.

Frequency of maintenance may vary depending upon geographic areas, such as coastal applications.

SERVICE TRAINING

Packaged Service Training programs are an excellent way to increase your knowledge of the equipment discussed in this manual, including:

- Unit Familiarization
- Maintenance
- Installation Overview
- Operating Sequence

A large selection of product, theory, and skills programs is available, using popular video-based formats and materials. All include video and/or slides, plus companion book.

Classroom Service Training plus "hands-on" the products in our labs can mean increased confidence that really pays dividends in faster troubleshooting, fewer callbacks. Course descriptions and schedules are in our catalog.

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